SIGNAL COMPRESSING SYSTEM

FIELD OF THE INVENTION

The present invention relates to a signal compressing system. A system according to the present invention is particularly suited for compressing image signals. The present disclosure is based on the disclosure in Korean Patent Application No. 92-3398 filed Feb. 29, 1992, which disclosure is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Image signals may be compressed by motion-compensated interframe discrete cosine transform (DCT) coding such as is defined by a MPEG (Moving Picture Expert Group) international standard. This form of signal compression has attracted much attention in the field of high definition television (HDTV).

FIG. 1 is a block diagram of such a conventional motion-compensated interframe DCT coder. In the shown coder, an image signal is divided into a plurality of sub-blocks. The sub-blocks are all of the same size, for example 8×8, 16×16, ... A motion estimator 40 produces a motion vector, defined by the difference between the current image signal and a one-frame delayed image signal, output by a frame memory 30. The motion vector is supplied to a motion compensator 50 which compensates the delayed image signal from the frame memory 30 on the basis of the motion vector. A first adder 8a serves to produce the difference between the present frame and the delayed, motion compensated frame. A discrete cosine transform portion 10 processes the difference signal, output by the first adder 8a, for a sub-block. The motion estimator 40 determines the motion vector by using a block matching algorithm.

The discrete cosine transformed signal is quantized by a quantizer 20. The image signal is scanned in a zig-zag manner to produce a runlength coded version thereof. The runlength coded signal comprises a plurality of strings which include a series of "0"s, representing the run length, and an amplitude value of any value except "0".

The runlength coded signal is dequantized by a dequantizer 21, inversely zig-zag scanned and inversely discrete cosine transformed by an inverse discrete cosine transforming portion 11. The transformed image signal is added to the motion-compensated estimate error signal by a second adder 8b. As a result the image signal is decoded into a signal corresponding to the original image signal.

Refresh switches RSW1, RSW2 are arranged between the adders 8a, 8b and the motion compensator 50 so as to provide the original image signal free from externally induced errors.

The runlength coded signal is also supplied to a variable length coder 80 which applies a variable length coding to the runlength coded image signal. The variable length coded signal is then output through a FIFO transfer buffer 70 as a coded image signal.

In motion-compensated adaptive DCT coding, the interframe signal can be easily estimated or coded by way of motion compensation, thereby obtaining a high coding efficiency, since the image signal has a relatively high correlation along the time axis. That is, according to the afore-mentioned method, the coding efficiency is high because most of the energy of a discrete cosine transformed signal is compressed at the lower end of its spectrum, resulting in long runs of "0"s in the runlength coded signal.

However, the scanning regime of the aforementioned method does not take account differences in the spectrum

e.g., data distribution of motion-compensated interframe DCT signal with time.

A method is known wherein one of a plurality of reference modes is previously selected on the basis of the difference between the present block and that of a previous frame and the image signal is scanned by way of a scanning pattern under the selected mode and suitably quantized. With such a method, however, three modes are employed to compute the energies of the intermediate and high frequency components of the image signal in accordance with the interframe or the intraframe modes in order to determine the appropriate mode. This mode determining procedure is undesirable complicated.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a signal compressing system, comprising coding means for scanning an input signal according to a plurality of different scanning patterns to provided coded versions thereof and selection means for selecting a scanning pattern which produces efficient coding according to a predetermined criterion and outputting a scanning pattern signal identifying the selected scanning pattern.

Preferably, the input signal is an inherently two-dimensional signal, for example, an image signal.

Preferably, the coding means codes the input signal according to a runlength coding regime.

Preferably, the system includes a variable length coder to variably length code the coded signal, produced by scanning according to the selected scanning pattern.

Preferably, the system includes discrete cosine transformer means to produce said input signal. The transformer means may be a motion-compensated interframe adaptive discrete cosine transformer.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the present invention will now be described, by way of example, with reference to FIGS. 2 and 3 of the accompanying drawings, in which:

FIG. 1 is a block diagram of a conventional adaptive interframe DCT coding system employing a motion compensating technique;

FIG. 2 is a block diagram of a coding system embodying the present invention; and

FIGS. 3(A) 3(H) show various possible scanning patterns according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 2, an input signal is divided into equal-sized sub-blocks, for example, 8×8, 16×16, ... A motion estimator 40 determines a motion vector by comparing the current frame and a one frame delayed signal from a frame memory 30.

The motion vector is supplied to a motion compensator 50 which, in turn, compensates the delayed frame signal for movement. A first adder 8a produces a difference signal representing the difference between the present frame and the delayed, motion-compensated frame. A DCT coder 10 DCT-codes the difference signal. The DCT coded image signal is quantized by a quantizer 20 and then dequantized by a dequantizer 21. The dequantized signal is supplied to a second adder 8b, via IDCT 11, which adds it to the output of the motion compensator 11. This produces a signal corresponding to the original image signal.